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THE SONORA—CHIHUAHUA DESERT TOUR

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The 1977 spring tour of the Arboretum School was mainly an extension of the 1975 tour, but also for the first couple of days a duplication of the earlier one.

This may be clarified by pointing out that the 1975 tour originated in San Diego, California, and terminated in Tucson, Arizona, whereas the present tour started in Tucson and, after traversing much of New Mexico and western Texas, including Big Bend National Park, ended in El Paso.

In both cases the genesis of these tours derived from the fact that my wife and I participated in the biennial conventions of the Cactus and Succulent Society of America. In 1975 these meetings took place in San Diego and, following its termination, our tour members met us there and we proceeded to visit Joshua Tree National Monument, Death Valley, Hoover Dam, the Desert Botanical Garden at Phoenix and several interesting gardens in the Tucson area. Since the details of this tour are rather fully described in Number 15 of this *Newsletter* (September 1975) only passing reference to it will form a part of this narrative.

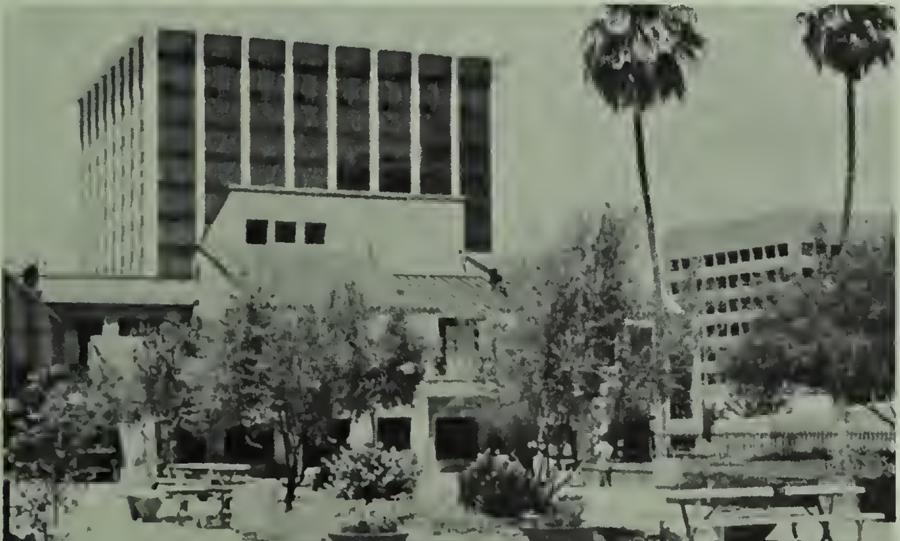

Fig. 1. View in La Placita, Tucson

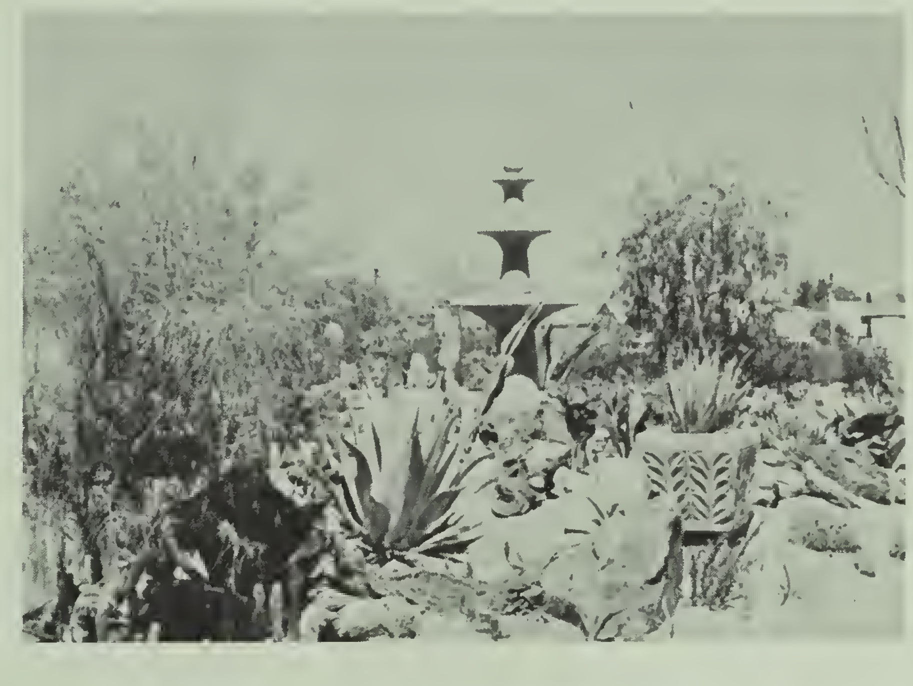

Fig. 2. Garden of the Arizona Growers, Tucson

A few words are in order concerning the setting of the 1977 Convention. Our hotel, the Marriott, is an integral part of a modern and very imaginative complex known as La Placita, in Tucson. This is a kind of bazaar comprising some 80 shops, restaurants, offices, apartments and a U.S. Post Office. In short, it is a self-contained village, embellished by pools, waterfalls and fountains, descending and ascending stairways and ramps, outdoor tables and benches and an attractive planting of ground-covers, vines, shrubs and trees. (Fig. 1). Among the last-named was a smallish tree with very narrow, trifoliate leaflets and pendant clusters of whitish fruits which greatly resembled those of our eastern poison sumac, *Rhus Vernix.* Not any of the local botanists attending the convention could name it for us, which was not surprising, since it is a native of South Africa, and was later identified by one of the growers of exotics as *Rhus lancea.*

The program for the Convention was, as usual, beautifully organized and highly diversified. Also, it was more international in character than is usually the case. There

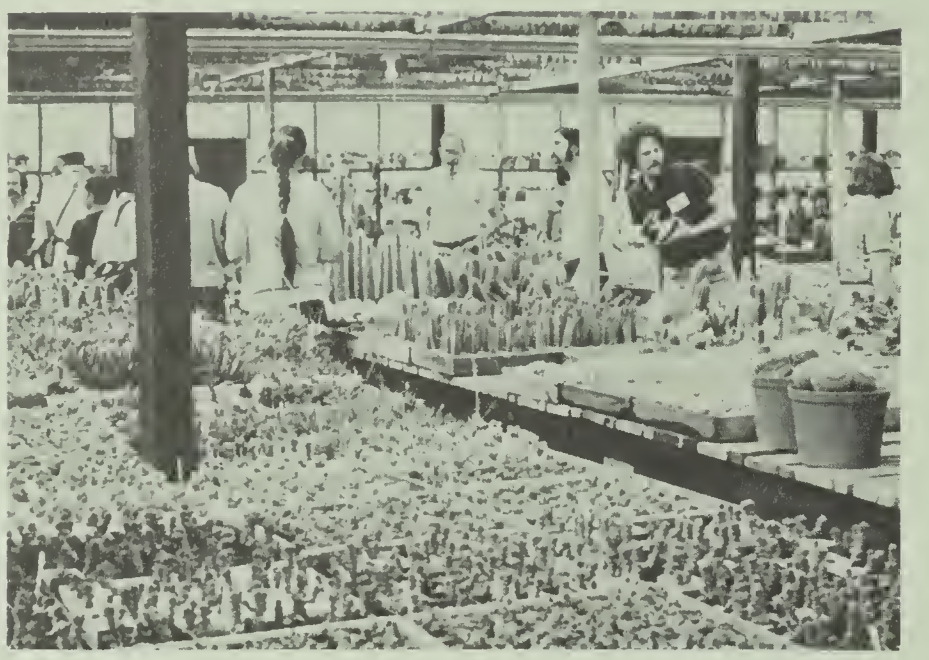

Fig. 3. Convention members in Tanque Verde Nursery, Tucson

were three speakers from South Africa, two from Germany, two from England and two from Mexico.

There were discussions of such individual genera as *Echinocereus, Cephalophyllum* and *Aloe* and a fascinating account of the unique vegetation of Baja California. As usual, the highlight of the program was a lecture by Dr. Lyman Benson, dean of American cactophiles. His topic was "The Arizona Desert" and he prefaced his talk with a very informative account of the deserts of the world.

The dates of this, the Seventeenth Biennial Convention of the C.S.S.A., were May 16th through 20th, with registration beginning at noon on Sunday, the 16th. Monday, Wednesday and Friday were devoted to the presentation of papers, leaving Tuesday and Thursday free for field trips.

Several of us had gone out a day ahead of time and on Sunday afternoon were able to visit a couple of private gardens and a very attractive nursery known as the Arizona Growers. Here, in addition to row after row of cacti and other succulents under cover, there was an extensive outdoor garden in which many desert plants other than succulents were artistically displayed (Fig. 2). Here, for example, we saw such species as velvet-leaf gaura *(G. parviflora),* desert evening-primrose (*Oenothera speciosa)* and brittle-bush *(Encelia farinosa).* We resolved on the spot to bring our tour group here, since we realized that it would give them a preview of many of the plants we were later to see on the deserts.

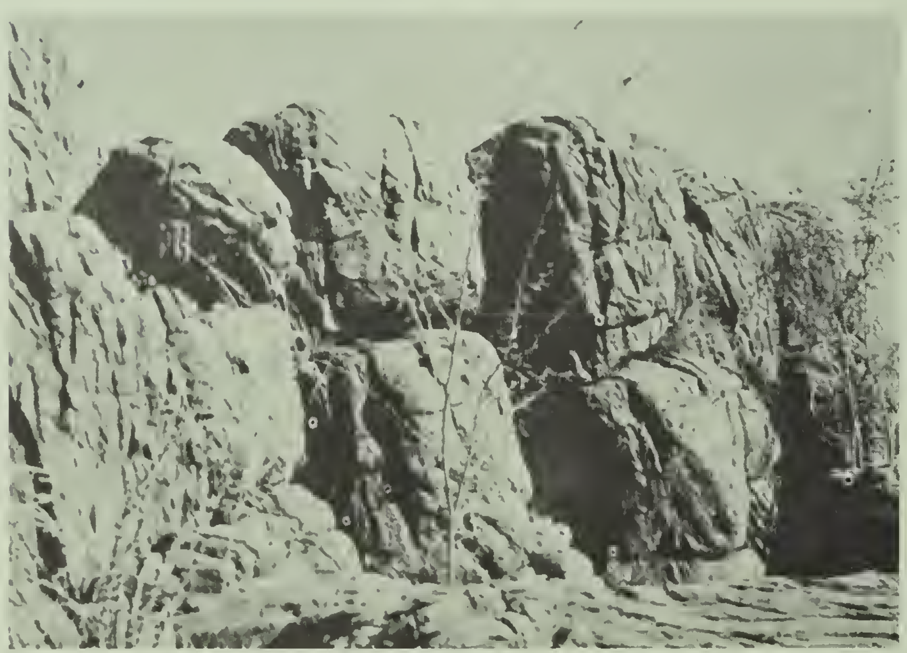

Fig. 4. Entrance to Earth Sciences Exhibit, Arizona-Sonora Desert Museum, Tucson

As already indicated, Tuesday and Thursday were devoted to field trips and accordingly on Tuesday, May 17, we were taken first to visit the Tanque Verde Nursery, said to be the largest grower of cacti and succulents in the state. Most of its houses were closed, but the two which were open for retail business were enthusiastically patronized by members of the Convention. (Fig. 3).

Luncheon that day was an al fresco affair provided by the members of the Women's Committee of the newly established Tucson Botanical Garden. Some of us had the pleasure of chatting with Colonial H. C. Parham, the founder and director of this garden, who informed us that he was greatly encouraged by the support he had received from the community.

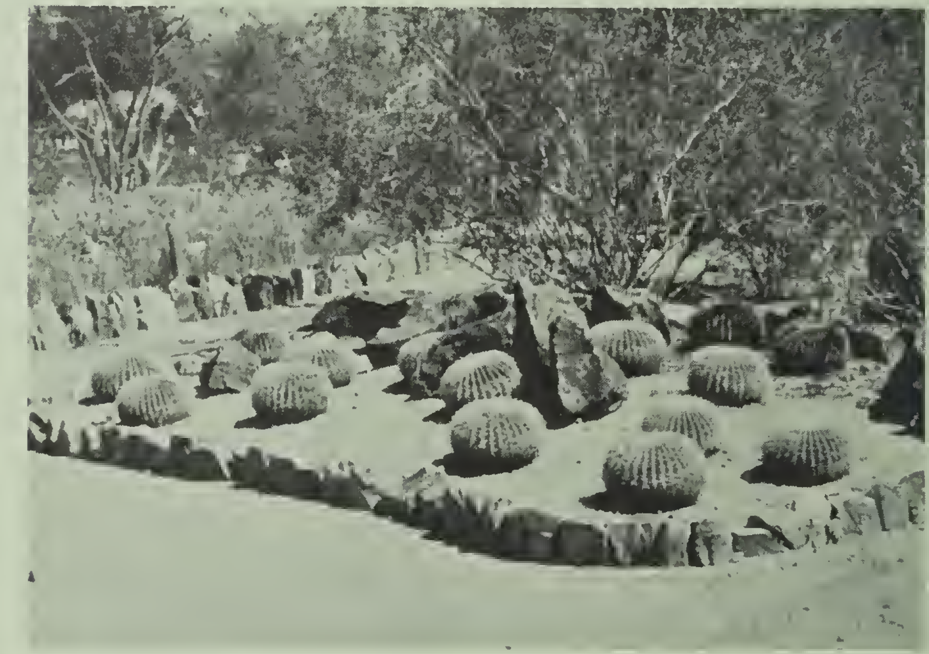

Fig. 5. *Echinocactus Grusonii* in Desert Botanical Garden, Phoenix, Arizona

Early that afternoon we made a brief visit to Bach's Nursery (another wholesale grower of cacti and succulents) and then drove several miles west of the city to the Arizona-Sonora Desert Museum where we spent about two hours.

Since our 1975 tour had visited this superb institution and I had recorded its salient features in an earlier *Newsletter,* only two additional observations are pertinent here.

First, William H. Woodin, who was director of the Museum for 17 years has recently retired and his place has been taken by Holt Bodinson, whom we had the pleasure of meeting.

Second, just a few days prior to our visit the Museum had opened its new Earth Sciences section. This consists of a subterranean tunnel which leads one far below the limestone surface and through a series of illuminated caverns which reveal the past history of this area when, millions of years ago, it was part of a warm shallow area. In these caves one can observe the result of the long slow action of acidic water in forming stalactites and stalagmites and

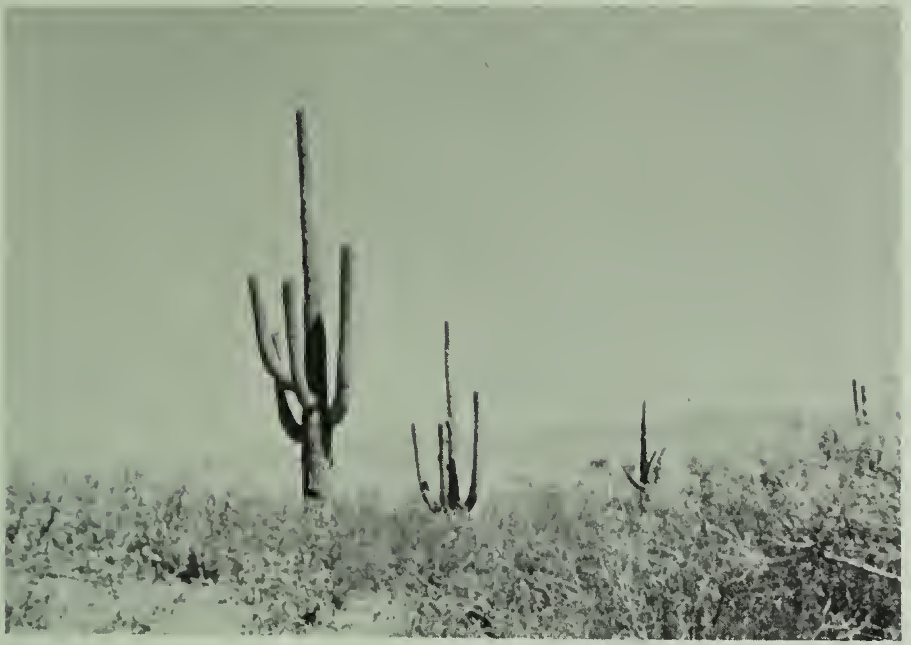

Fig. 6. View in Saguaro National Monument

learn something of the life forms which flourished here countless eons ago. We were to bring our own tour group here four days later. (Fig. 4)

Thursday was devoted to visiting two more of Arizona's fine botanical installations: the Boyce Thompson Southwest Arboretum at Superior and the Desert Botanical Garden at Phoenix. Here again, it was "second time around" for us and descriptions will be found in Number 15 *Newsletter* (Fig. 5)

In the case of the Desert Botanical Garden, mention should be made of the fact that Dr. W. Hubert Earle, for many years its director, has recently resigned. Dr. Earle is the author of an important publication on "The Cacti of the Southwest", which has passed through many editions. His place has been taken by Rodney G. Engard, who was on hand to welcome the members of the Convention.

It was our great pleasure that evening to have dinner with our old friend, Roger Conant, formerly director of the Philadelphia Zoo. Although Roger is now living in Albuquerque, he has been coming to Tucson from time to time to finish an important piece of herpetological research, and we were so fortunate as to catch him during one of these visits.

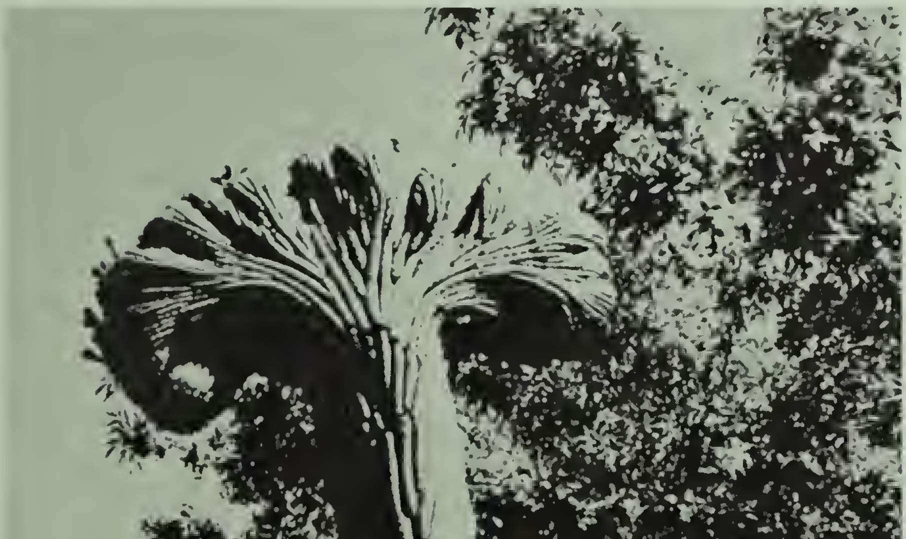

Fig. 7. Crest on *Carnegiea gigantea*

About noon on Friday, May 20, I went to the airport in Tucson to meet the members of our Arboretum Tour who had flown out from Philadelphia and points east. That afternoon, because it was close to the city, and so rich in its diversified offerings, we took them to the Arizona-Sonora Desert Museum.

On Saturday, May 21, our first visit was to the Saguaro National Monument east of Tucson. This sojourn provided us with the first real opportunity to discuss with our group the vegetational characteristics of our southwestern deserts. As is our practice, we had given to each of our members a set of mimeographed lists enumerating the typical plant species of our three great deserts: the Mojave, the Sonora and the Chihuahua. Our 1975 tour had been restricted very largely to the Mojave desert, where the Joshua tree *(Yucca brevifolia)*, is one of the chief indicator species. Here we were in the Sonora, where the giant cactus or saguaro (*Carnegiea gigantea)* is an important key plant.

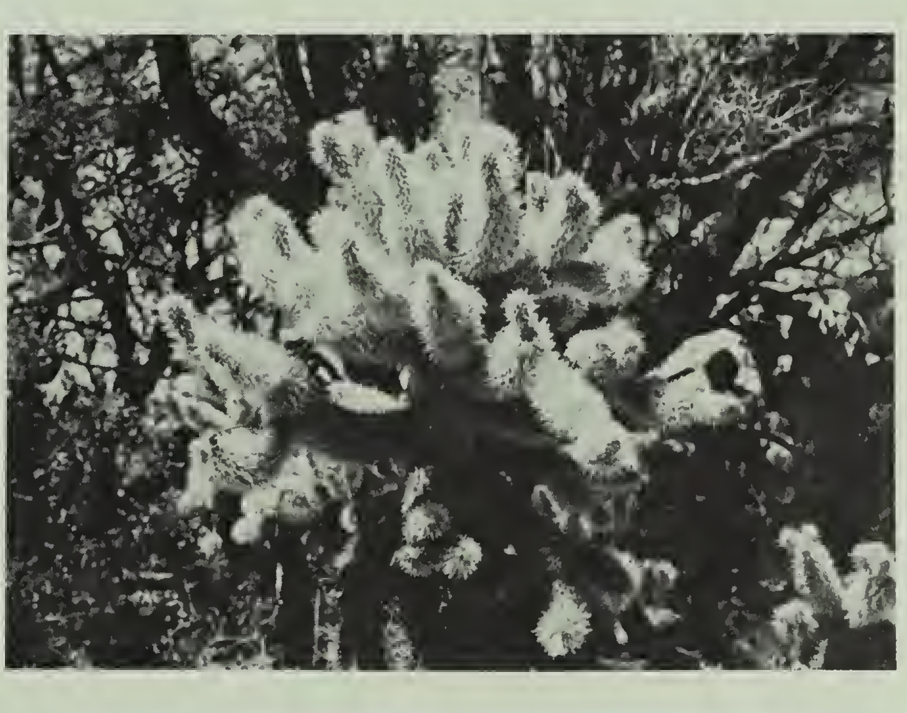

Fig. 8. *Opuntia Bigelovii,* the teddy-bear cholla

It must be emphasized that these lists should be interpreted with a great deal of discretion. Although each of these deserts has its own assemblage of species, certain plants are found in all three. Notable examples are the ocotillo *(Fouquieria splendens)* and the cresote bush *(Larrea divaricata*), which occur widely across our southwestern states from southern California to western Texas. Even the saguaro, a key plant of the Sonora desert and largely confined to Arizona, has been reported from as far west as California.

No one who beholds these giant cacti in a concentrated natural setting can fail to be impressed by their majesty (Fig. 6). They may reach a height of 50 feet, an age of 200 years and have as many as 30 or 40 branches, although the number is usually smaller. Occasionally the apex is modified into a hugh crest, like the one at the Arizona-Sonora Museum (Fig. 7). The pure white corollas of the saguaro are the state flower of Arizona and no symbol could be more appropriate.

Next to saguaro, the most conspicuous plant along the way, as well as in the Monument itself, was the palo verde,

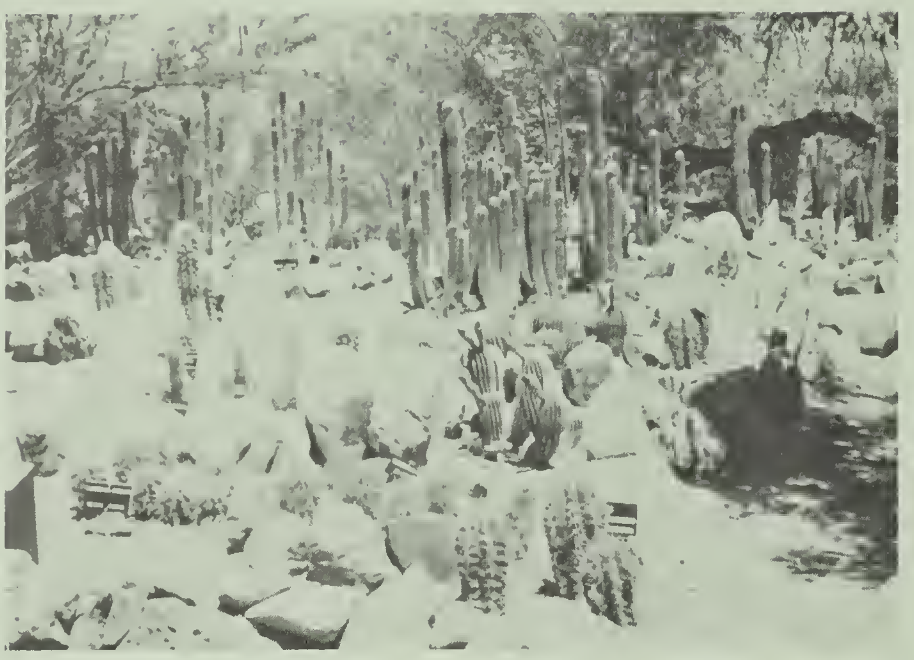

Fig. 9. Portion of cactus garden in Boyce Thompson Southwestern Arboretum

the state tree of Arizona. This is *Cercidium floridum,* a small leguminous tree with greenish trunks and light yellow flowers.

Friends of ours, who spend their winters near Tucson, had told us that despite a long dry dormant season there had been an abundant rainfall in April and that as a result there should be a good show of color in the desert in May. This was certainly evident in the case of the palo verde which was in full flower. There were places where, as far as one could see, there was nothing but a solid golden haze.

Another dominant, though less showy plant, was the mesquite *(Prosopis julifera)* with its racemes of light yellow flowers. This is an important food plant for cattle.

In the Sonora, as in the other two deserts, cacti are ubiquitous and the most conspicuous genus is likely to be *Opuntia.* The species in this large group fall into two subgenera: those with flattened pads or joints, (the prickly-pear type) and those with cylindrical joints, (the chollas).

Among the first category were such species as *basilaris* (the beaver-tail), *fragilis, ursina, hystricina, phaeacantha, Gosseliniana* var. *santa-rita* (with purple pads) and *Engelmannii.*

Representing the chollas were: *arbuscula* (the pencil cholla), *leptocaulis, Bigelovii* (the teddy-bear or jumping cholla), *acanthocarpa, fulgida, spinosior* and several others. It is of interest to note that although some of these same species occur in the Chihuahua, that desert supports many forms which are peculiar to it alone. (Fig. 8)

In addition to *Opuntia,* we saw on this morning's visit *Ferocactus* (the barrel cactus) and *Echinocereus* (the hedge-hog cactus).

The baccharis here (*B. sarothroides)* bears little resemblance to the groundsel-tree (*B. halimifolia*) of our Atlantic coast. It is a low shrub, with numerous upright branches and greatly reduced leaves, which is frequently the only green thing to be seen along the banks of the washes. Another common plant of such habitats is the desert willow *(Chilopsis linearis)*, which is not a willow at all, but a member of the Bignoniaceae with narrow leaves and luscious pinkish flowers.

After following the nine-mile drive which takes one through some spectacular scenery in the Monument, we made a brief stop near the mouth of the Sabino Creek Canyon and paid our respects to Senor de Grazia, the noted artist, in his fabulous studio and garden.

The balance of the afternoon was spent in the grounds of the Arizona Growers where, as we had hoped, the members of our group were able to become acquainted with many of the plants which we were later to find growing in the wild.

The following day, Sunday, May 22, was spent entirely in the Boyce Thompson Southwest Arboretum. For my wife and me this was "third time around", but we enjoyed it just as much as on our two previous visits. So great is the variety of attractions in this fine arboretum that one might return here at frequent intervals without exhausting its resources. For example, since we were there in 1975 an extensive new cactus garden had been added, which on the occasion of the present visit contained many handsome species, some of them in flower. (Fig. 9). Two superbly maintained green houses contain distinguished collections of cacti and other succulent plants.

Another distinctive feature of this arboretum is that its affiliation with the University of Arizona enables graduate students to take up residence here while pursuing research leading to both the master's and the doctor's degrees in biology. (Fig. 10).

At noon on Monday, May 23, we flew from Tucson to El Paso where we found waiting for us our chartered motorcoach and Bob Greer, our very competent and accommodating driver.

The 50-mile drive from El Paso to Las Cruces, New Mexico, was at first largely through agricultural country, made possible by an extensive irrigation system. There were vast fields of barley, onions, and lettuce, but soon all this was left behind, and we entered an area devoted to the growing of pecans. In one plantation alone, said to be the largest in the world, there were over a million trees.

A few miles south of Las Cruces we stopped briefly at the little town of Mesilla, a period piece of the middle of the last century which has changed little over the years.

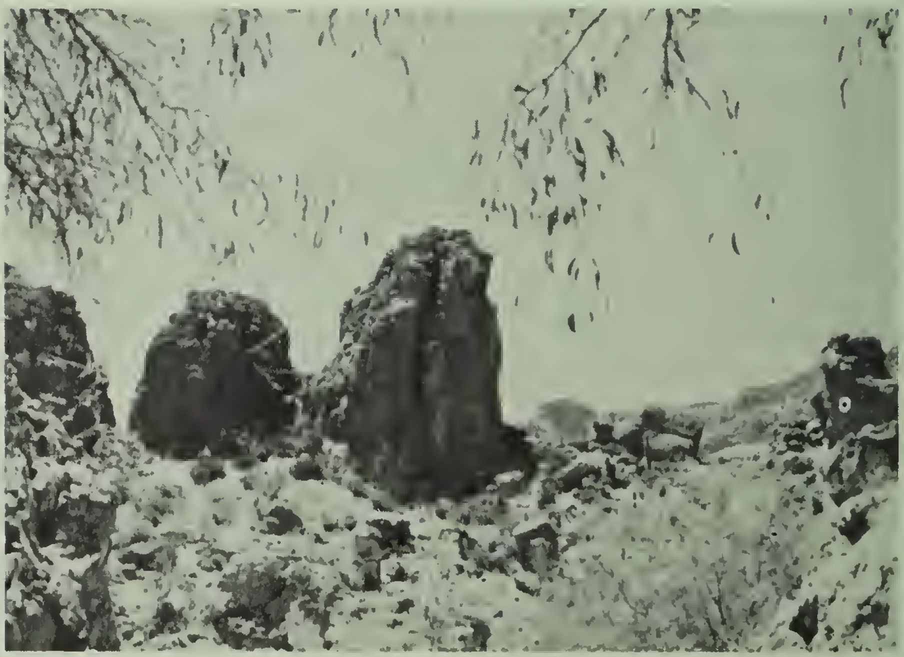

Fig. 10. Rock formations in Boyce Thompson Southwestern Arboretum

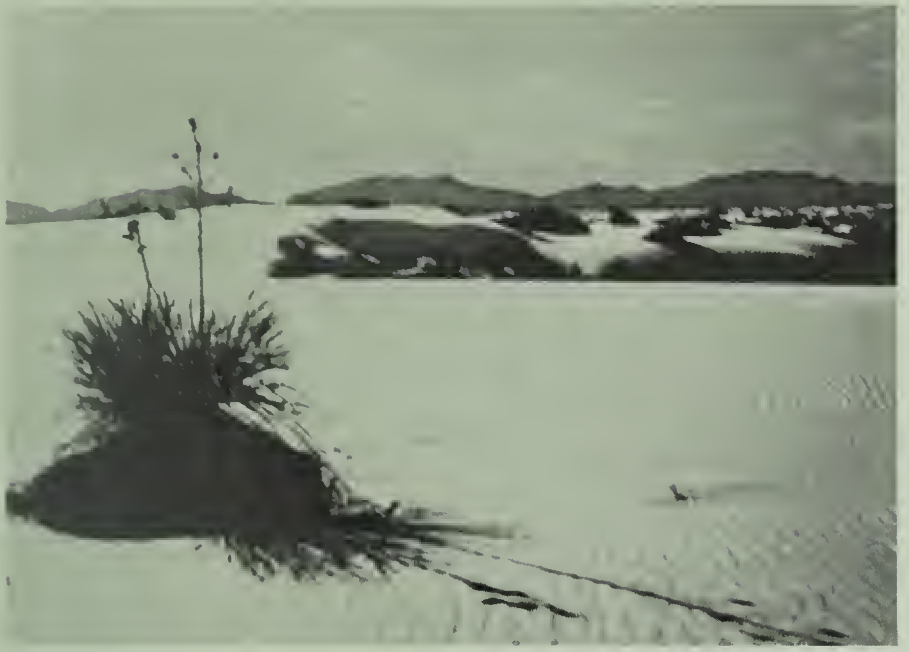

Fig. 11. General view in White Sands National Monument

The court house, which dates from 1850, was once the capital of New Mexico and Arizona and it was in it that Billy the Kid, famous outlaw, was tried and sentenced to hang. Across the street is the saloon in which he was captured.

We had dinner that evening with Dr. Fred B. Widmoyer and his charming wife. Fred is professor of horticulture at New Mexico State University and for several years has been the very efficient secretary of the American Association of Botanical Gardens and Arboreta. We sat for a while on their terrace watching the descending sun play a symphony of color on the Organ Mountains, miles off to the east. They then took us to a delightful restaurant with an indoor planting of exotic trees and shrubs and later to visit the celebrated Holiday Inn, which is furnished almost entirely with antiques. Fred had been a consultant with respect to the indoor planting and every where we looked there were botanical surprises.

Our route the following morning led us eastward from Las Cruces, across an extensive desert area and up and over the San Andreas Mountains to White Sands National Monument.

We were now truly in the Chuihuahua Desert and we made several stops to examine the vegetation. It is true that ocotillo and cresote bush were still with us — as they would continue to be — but now for the first time we began seeing some of the plants that were on our mimeographed list of "indicator" species. Chief among them were the sotol *(Dasylirion Wheeleri)* and the lecheguilla (*Agave lecheguilla).* Neither of them was in bloom in this region, but we noted on all sides the tall narrow last year's fruiting stalks of the sotol.

At one stop we were delighted by the great mats of *Castilleja latebracteata,* a scarlet-flowered relative of our Eastern Indian paintbrush. Here, also was the Apache plume *(Fallugia paradoxa).* This is a rosaceous shrub with white flowers and fruits in clusters with long feathery purple tails. Needless to say, we were surrounded on all sides by a confusing array of composites belonging to such genera as *Encelia, Baccharis, Flaveria* and *Berlandiera.* The local representatives of *Gaillardia* and *Zinnia* bear little if any resemblance to those plants as we know them in our gardens at home. Even the little mounded marigolds *(Tagetes)* gave slight promise of the spectacular forms into which plant breeders have molded them.

When we had first visited White Sands some thirty years ago there was little here but a modest hut. Today there is a handsome reception center with a museum, a book store and an auditorium in which a slide show is provided at intervals. There is also a nine mile drive on a paved road taking one into the heart of the area with frequent turnoffs for a bus the size of ours.

The brochure which we were given states, "The White Sands is a sea of graceful, white gypsum dunes — a landscape of stark natural beauty". No description could be more apt. The area must be seen to be fully appreciated; it is like a vast undulating desert of pure driven snow with only here and there a small patch of vegetation, usually in the dune hollows. The prevailingly southerly winds, which are at their strongest in early spring, result in dune movement which creates harsh conditions for plant communities. (Fig. 11).

In the space of time allotted to us we were most impressed by two species of plants which by their vigorous underground roots were able to build up resistant mounds of gypsum sand. One was the hoary rosemary mint (*Poliomintha incana),* the other a shrubby sumac *(Rhus trilobata)* (Fig. 12). An occasional soap-tree yucca (*Y. elata)* stood out like a sentinel, challenging the elements.

For sheer contract in this sea of white were the spectacular brick-red flowers of the claret-cup cactus *(Echinocereus triglochidiatus* var. *gonacanthus),* while only a shade less showy was its close relative, *E. Fendleri.* A prickly pear *(Opuntia erinacea)* was ubiquitous, though not in flower.

After stopping for lunch at Alamagordo we ascended the Sacramento Mountains, with its spectacular exposures of sedimentary rocks (Fig. 13) and continued eastward to Artesia, where we turned abruptly south through Carlsbad to White's City, which was to be our headquarters for two nights.

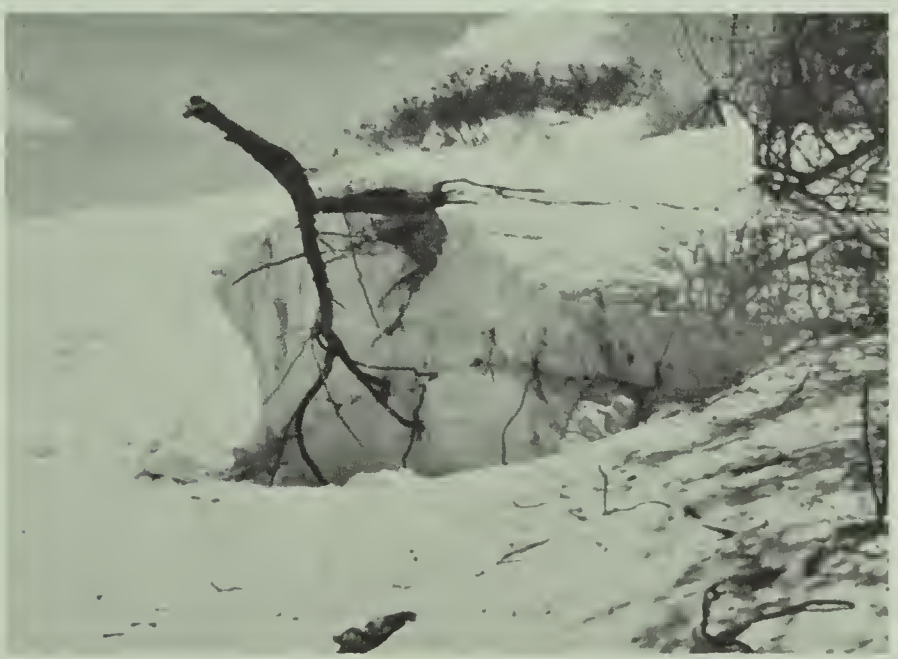

Fig. 12. Dead sumac roots creating a dune-head in White Sands

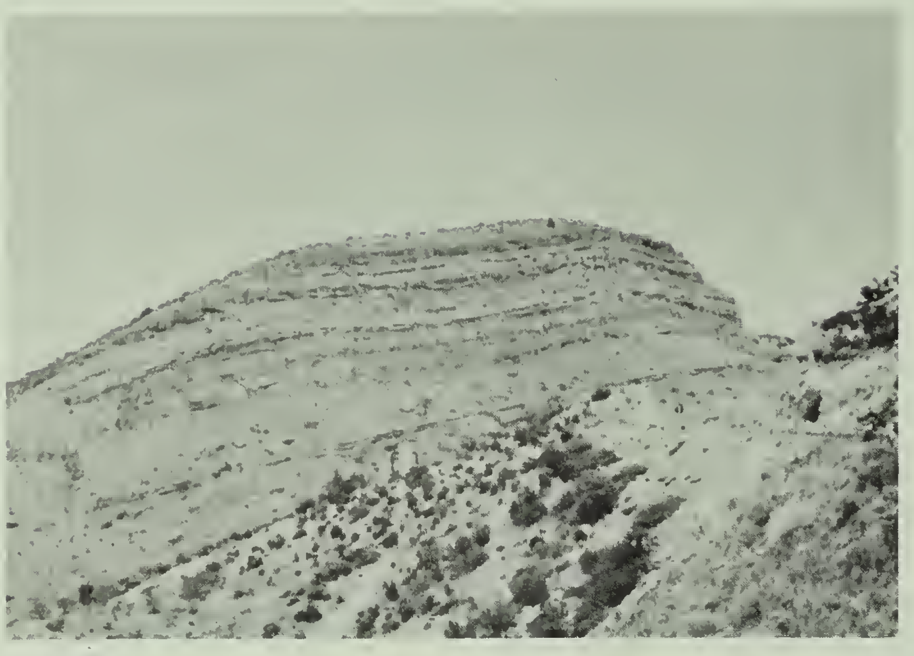

Fig. 13. Sedimentary formations in the Sacramento Mountains

It was along this leg of our journey that we first began seeing, as a roadside weed, that vilest smelling member of the gourd family (*Cucurbita foetidissima).* This large, triangular-leaved plant has golden yellow flowers and produces globose yellow gourds about three inches in diameter. As an antidote to the nauseating odor of its bruised foliage, there were a fragrant little gaura *(G. coccinea),* numerous stands of Roemer cassia (*C. Roemerianus)* and two species of *Zinnia.*

The next day we drove north of the city of Carlsbad to visit the newly established Living Desert State Park, which is operated and maintained by the City of Carlsbad under a joint agreement with the New Mexico Park and Recreation Commission. Here we were warmly welcomed by Mr. N. Dean Ricer, the director, who, despite his many administrative duties, insisted upon accompanying our group on a tour of the grounds.

Although a very new institution, dating back only to 1971, this garden has made enormous strides and bids fair to becoming one of the most important parks of its kind in all of our southwest. The handsome entry building contains a number of attractive exhibits, including a display of minerals from all over the world. On the grounds one finds an extensive cactus garden, an aviary, a prairie-dog "town" and a subterranean section for viewing nocturnal animals. There is an exhibit devoted to reptiles, a duck pond and a huge central amphitheater containing pronghorns, deer, elk, bison, javelinas or wild pigs, and other animals, all in a very naturalistic setting. Surrounding the park is an arboretum, filled with a wide variety of native and exotic trees and shrubs.

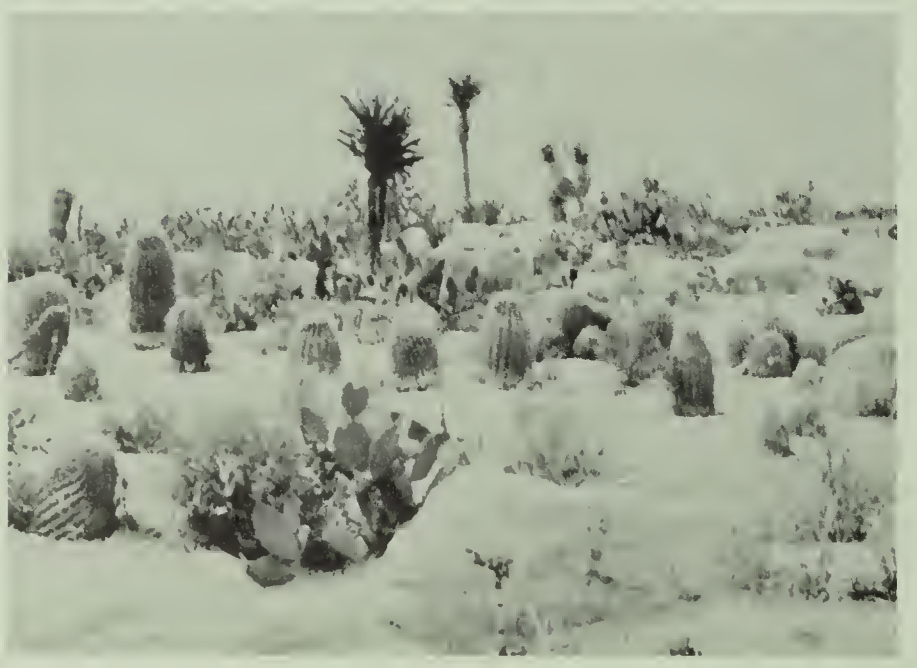

Fig. 14. Cactus Garden in the Living Desert State Park

This park is situated on a formation of sandstones and limestones laid down in shallow seas in Permian times, which means that it is about 250,000,000 years of age. This same formation continues for some 25 miles in a southwesterly direction to provide the materials out of which nature has fashioned the Carlsbad Caverns. The afternoon was devoted to visiting these celebrated caves.

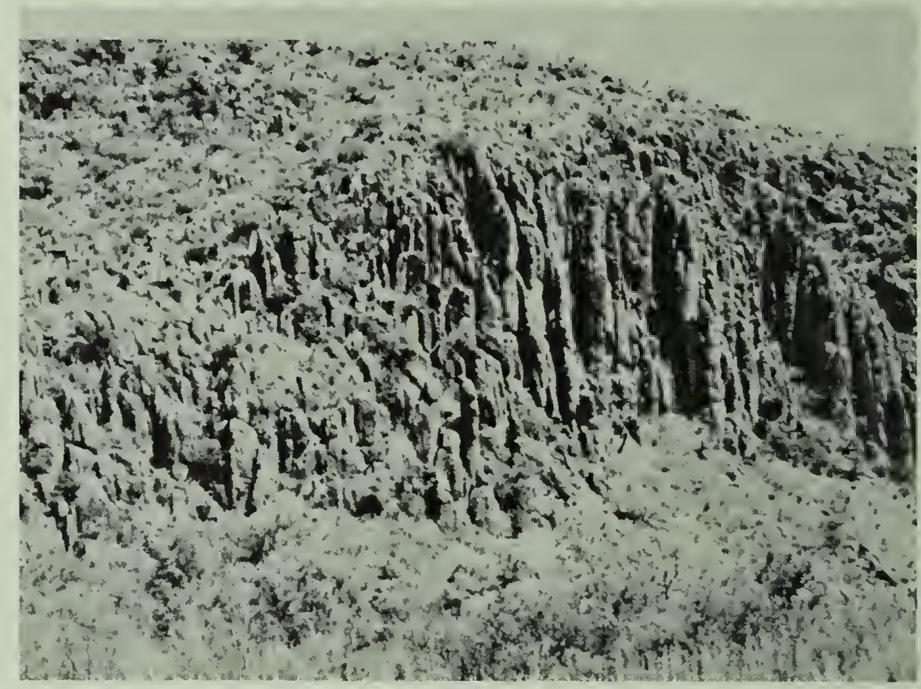

Fig. 15. Rock formations in Lympia River Canyon

So much has been written about this vast subterranean wonderland that any attempt to describe it here would be superfluous. Suffice it to say that those members of our group who had not experienced it before were properly impressed by its magnitude and infinite variety.

That evening we sat in the huge amphitheater near the entrance to the caverns and witnessed the emergence and flight of the many thousands of bats which nightly fly some 50 miles and back to their feeding grounds, returning to their base shortly before dawn. It was this phenomenal flight which more than half a century ago first revealed the existence of these caverns to cowboy Jim White, for whom White's City is named.

We departed from White's City on the morning of Thursday, May 26, and drove southward into Texas, following for many miles the western watershed of the famed Pecos River, the scene of so many episodes in the settling of our Southwest. It was a little after eleven by our watches when we entered the once-frontier town of Pecos — certainly too early for a mid-day meal. Fortunately our driver, seeking a parking place drew up practically in front of the West of the Pecos Museum, where we spent a very pleasant half hour inspecting its treasures which included authentic reproductions of a bar (with a working nickelo-

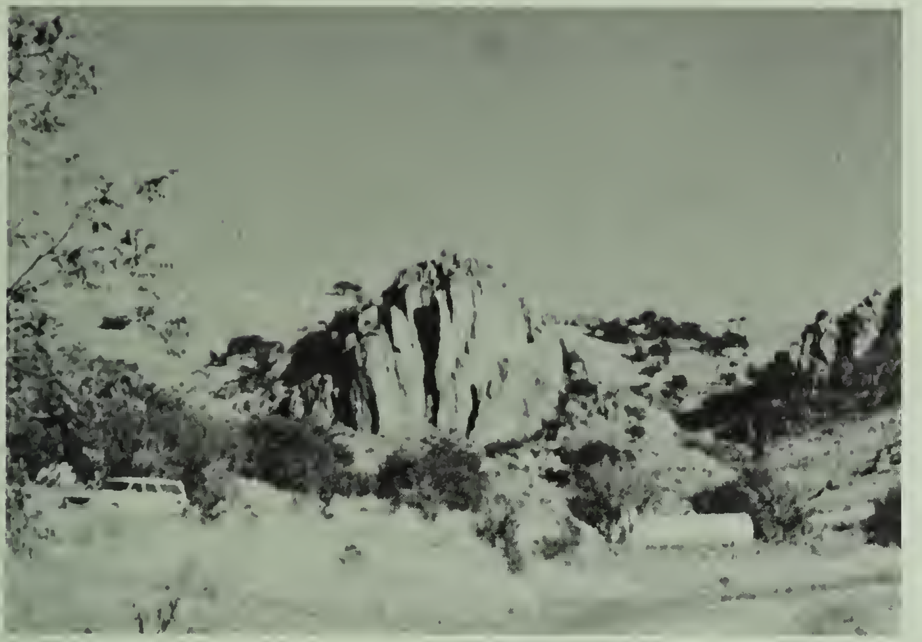

Fig. 16. General view in Fort Davis

deon), a school-room, a barbershop, a printing press, numerous bed-rooms (for the place had once been an inn) the inevitable portraits of those who had made Pecos history and (most interesting to many of us) the enormous seven foot long tusk of a mammoth which had ranged these hills only a short ten thousand or so years ago.

Then, suddenly, some one realized that in entering Texas we had crossed from Mountain Time back into Central Time so that it was really 12:30 instead of only 11:30. Immediately every one was hungry and we made for the nearest restaurant!

In a field adjoining our eating place we were amazed to observe a solid stand of a sea-lavender, closely resembling *Limonium carolinianum* of the brackish marshes of our eastern Atlantic costal area. This species, however, was *L. limbatum* and of it B. H. Warnock in his book *Wildflowers of the Guadelope Mountains and the Sand Dune Country, Texas,* says "One of the rewards for stopping in or near the alkaline lakes around Pecos will be to see this beautiful bushy-topped perennial herb." We considered ourselves fortunate to have discovered this inland representative of the Plumbaginaceae.

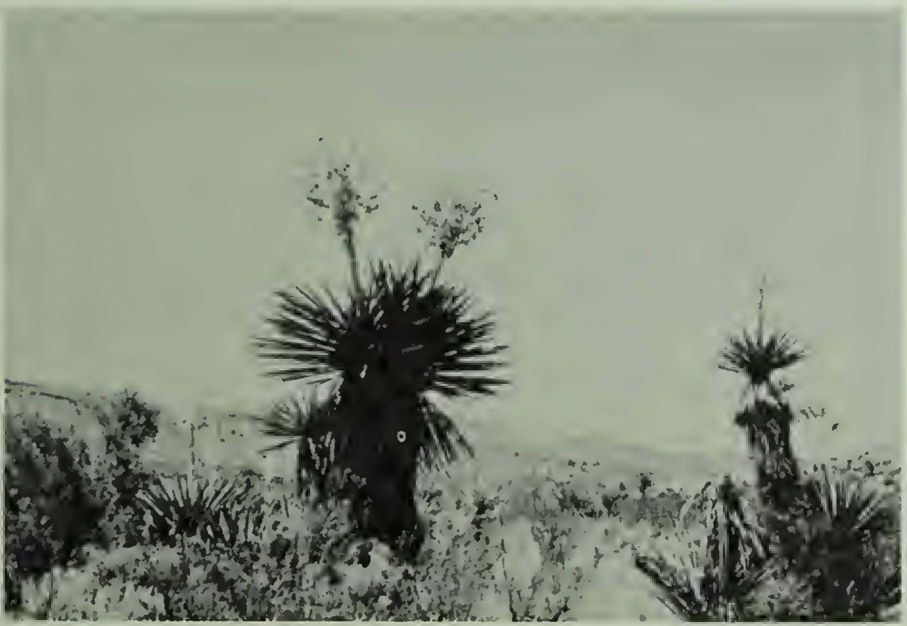

Fig. 17. *Yucca carnerosana,* the "giant dagger", in Big Bend National Park

Following lunch we continued in a southerly direction, first across miles of desolate prairie scrub, then upward through the Lympia River Canyon, with its tortured igneous rocks. (Fig. 15). A roadside stop on the ascent yielded an attractive salmon-flowered desert mallow *(Sphaeralcea Fendleri),* a low-growing pink-flowered phlox *(P. mesoleuca)* and an appealing little yellow-flowered flax with reddish lines radiating from the center of the corolla. This we identified as *Linum rigidum* var. *Berlandieri.*

By mid-afternoon we found ourselves entering the extensive grounds of Fort Jefferson Davis, a national historical site, in which are preserved the structures of a defensive post estalished in the 1860's to withstand the attacks of nearby Indian tribes.

The grounds are surrounded on two sides by towering basaltic boulders which have been eroded into weird shapes. (Fig. 16). Some of us scrambled up through this "obstacle course" and were rewarded by finding *Berberis trifoliata,* prematurely in fruit with bright red berries standing out against the evergreen foliage.

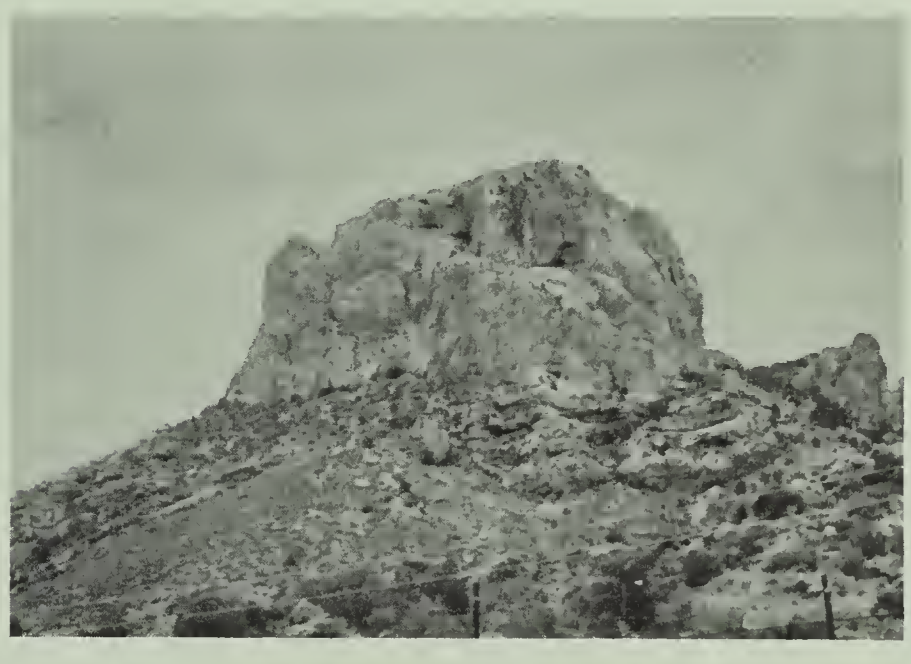

Fig. 18. Casa Grande, in Chisos Basin, Big Bend National Park

That night we spent at Indian Lodge a few miles west of Fort Davis, where again we lay in an amphitheater of igneous boulders, up among which, almost within minutes of our arrival, the more ambitious members of our party were soon lost to sight.

On Friday, May 27, we departed from Indian Lodge and drove southward through Alpine and Marathon toward Big Bend National Park.

For the most part this morning's drive proved rather unproductive, save for one redeeming feature: we finally caught up with lecheguilla in flower, its tall narrow reddish cylindrical spikes almost as showy as ocotillo against the bright blue Texas sky. We now realized that we must have been traveling through acres of it, but that only now, as we moved southward, were we coming into the zone where it was beginning to bloom.

Late that forenoon we entered Big Bend National Park through Persimmon Gap. If any of our group had expected to see here stands of our eastern persimmon *(Diospyros virginica)* they were doomed to disappoint-

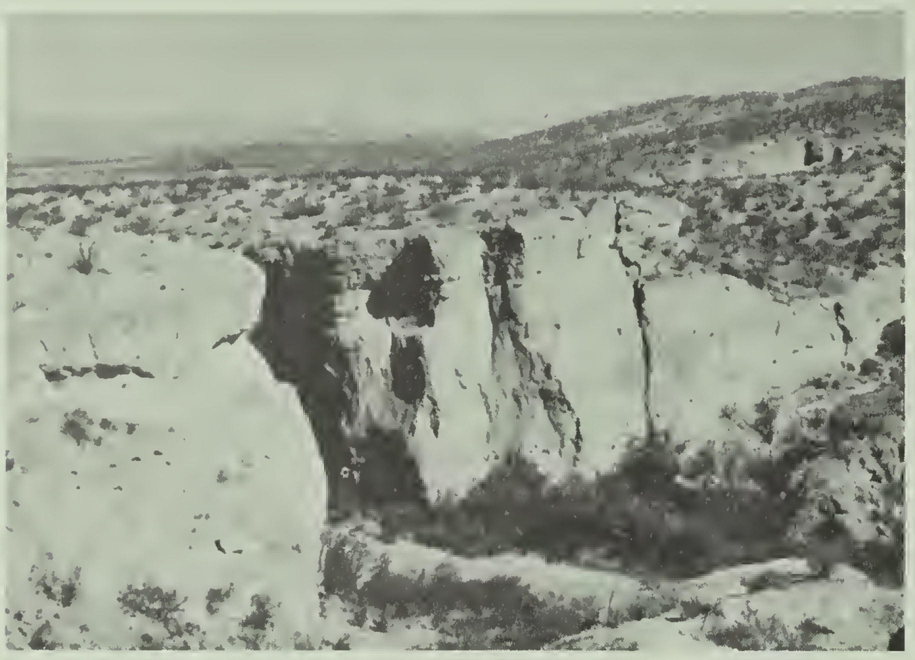

Fig. 19. Tuff Canyon, Big Bend National Park

ment. The species here is *D. texana,* a shrub or small tree with smooth gray bark and leathery evergreen leaves.

This magnificent park, of some 700,000 acres, occupies a superbly scenic area in the U-shaped bend of the Rio Grande River which forms the boundary between the United States and Mexico.

We had been advised that if the "Giant Daggers" were in bloom it would be well worth our while to leave the paved road and drive eight miles across the desert to see them. We knew that the giant daggers were *Yucca carnerosana,* but we had no way of knowing whether or not they were in flower. So, when we approached the turn-off, a decision had to be made. Since our good driver, Bob, was willing to take off across a mere wisp of a sandy road, we left the highway and were soon glad that we had.

Out of the 40 or so species of *Yucca* this one is certainly the most impressive and it was our good fortune to find it at or near the very peak of its bloom, (Fig. 17). Many of these plants were at least 20 feet tall and their inflorescences contained many hundreds of pure white flowers. (One report puts the number at a thousand).

The basal rosette leaves of the lecheguilla were all around us (although only a very few were as yet in flower) and among the cacti one of the most conspicuous was a hedgehog, *Echinocereus rigidissimus.*

After reveling in the excitement of this location, made even more so by the rock formations on all sides, we made our way back to the paved road and continued on to headquarters.

The scenery in this park all but defeats description. Like so much of this portion of our continent, the area was under water many millions of years ago and received thick deposits of lime and shale. Later uplifted and acted upon by the forces of erosion and vulcanism, it has been fashioned into a series of buttresses, ridges, spires, pinnacles and mesas contrasting dramatically with arroyos, gorges and canyons. In altitude it ranges from near sea level to more than 8,000 feet. Vegetationally it varies from sparse desert and prairie scrub to pinyon-pine and juniper forest. One of our old friends in this formation was the madrone *(Arbutus Menziesii)* with its handsome light brown bark. Also present were dense stands of Apache plume *(Fallugia paradoxa)*, which we had seen earlier in New Mexico.

Our accommodations in the Park were in the Chisos Mountain Lodge at an altitude of 5400 feet, surrounded on all sides by bastions of volcanic rock. The tallest of these called Casa Grande (over 7300 feet) was directly behind our apartment. (Fig. 18). The view from the restaurant would in itself have been worth the price of admission, had there been one.

That afternoon we elected to drive eastward across the Park to Boquillas Canyon, where the Rio Grande has etched a sharp dividing line between Old Mexico and Texas.

As we approached the canyon one of our members, Lisa Hafsten, who is president of the Indianapolis Chapter of the American Bromeliad Society, informed us that just before passing under a tunnel over the road there is an historically important stand of *Hechtia scariosa.* We therefore stopped the bus and within a very short time had located a stand of this species on a rocky slope.

While most bromeliads are denizens of tropical rain forests, where because of their overlapping leaf bases they are known as tank epiphytes, a few genera, such as *Hechtia, Dyckia* and *Puya* are found as terrestrial plants in dry rocky situations. We were delighted to see this one.

The view from the overlook at Boquillas, where the Rio Grande cuts across the Sierra del Carmen, affords an eye-stretching view across into Old Mexico.

We were intrigued by a tiny legume with yellow flowers which formed mats on the roadside. It sometimes appears that the smallest plants have the longest names; this one was *Hoffmanseggia densiflora!*

On the return trip we stopped to take pictures of the rock formations in Avary Canyon. This was different from anything we had seen before, as shafts of sunlight played upon a varied panorama of geological shapes and colors.

The following morning we proceeded in a southwesterly direction across the park, stopping occasionally to enjoy its rugged scenery. The most spectacular spot was at Tuff

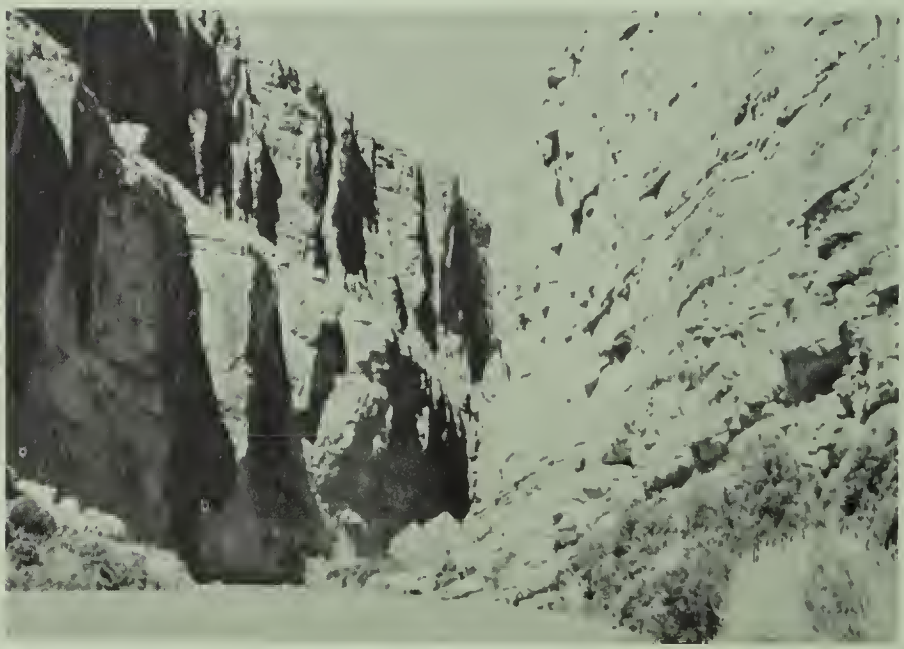

Fig. 20. Santa Elena Canyon, Big Bend National Park

Canyon, where one descends to a look-out platform which provides a glimpse into the mouth of this cleft in the mountains. (Fig. 19).

Our destination that forenoon was the Santa Elena Canyon at the far western edge of the park. This is an awesome sight, for one gazes into the mouth of a gorge from which the Rio Grande emerges after having cut its way for 18 miles through the Mesa de Anguila. Here, at the river's exit, the walls of the Canyon arise some 1500 feet; those on the eastern side are in the United States while those across from them are in Mexico (Fig. 20).

A well devised trail, with cement steps and railing in the steepest part, permits easy access for a mile or more into the heart of the canyon. Several of the plants along the trail bear elaborate descriptive labels; these included our old friend, the lecheguilla, and our most recent acquaintance, *Hechtia scariosa.*

We ate our box lunches in the picnic area near the canyon, then drove north, leaving the Park at the Study Butte Entrance, and proceeded through Ghost Town to Lajitas. From here to Presidio the highway closely paralleled the Rio Grande and we were treated to many fine views of cliffs and ravines across the river on the Mexican side. Our destination that evening was at the town of Marfa.

Our final day's run on May 29, took us across some 200 miles of typical Chihuahua desert country from Marfa through Van Horn to El Paso. There was little in the way of botanical novelty on this trip, but it did enable us to review much of what we had learned and certainly left most of us with a keen desire to see more of this fascinating country. The following day we flew home from El Paso.

THE FORMAL GARDEN

MAUREEN E. PRATT

The formal garden has always been a showy feature of the Arboretum, composed of large masses of a small number of perennial species. It was time to rejuvenate the bed by replacing many of the old, tired plants with new ones in a wide variety of species. Upon completion, there will be almost 400 different species and varieties in an area of 2160 square feet.

In the winter of 1975-76 I made a plan for the arrangement of the plants within the beds. Last summer some preliminary work was done. Most of the old plants were removed and the beds were enlarged to allow us to accommodate taller plants.

There follows a list of species now growing in this area. There are still a number of things to be planted in the fall, so this is not a complete list of the finished garden. At present there are 269 species and cultivars in 122 genera in 39 families. The plantings will be continually reworked as the need arises so that the garden will be as broad a represensation of herbaceous and low woody plants that can be grown in this area as is possible, as well as being visually pleasing.

Gramineae
  Calamagrostis x acutiflora
  Chasmanthium latifolium
  Helictotrichon sempervirens
  Miscanthus sinensis
  M. sinensis 'Zebrinus'
  Molinia caerulea 'Variegata'
  Pennisetum alopecuroides
  Spartina pectinata 'Aureomarginata'

Cyperaceae
  Carex Morrowii 'Variegata'

Liliaceae
  Asphodeline lutea
  Hemerocallis fulva
  H. 'George Yeld'
  H. 'Rubra'
  Kniphofia Uvaria
  Lilium 'Enchantment'

Agavaceae
  Yucca flaccida 'Ivory Tower'

Alliaceae
  Allium giganteum
  A. senescens
  A. senescens glaucum

Iridaceae
  Belamcanda chinensis
  Crocosmia Masoniorum
  C. Pottsii

Polygonaceae
  Polygonum Bistorta 'Border Jewel'

Caryophyllaceae
  Arenaria montana
  A. verna 'Aurea'
  Dianthus x Allwoodii
  D. deltoides
  D. gratianopolitanus
  D. plumarius
  Gypsophila pacifica
  G. paniculata
  G. repens 'Alba'
  Lychnis chalcedonica
  L. Coronaria 'Atrosanguinea'
  Tunica saxifraga

Ranunculaceae
  Aconitum Carmichaelii
  Anemone x hybrida 'Alba'
  A. x hybrida 'Max Vogel'
  A. x hybrida 'Queen Charlotte'
  A. vitifolia 'Robustissima'
  Cimicifuga simplex
  Clematis heracleifolia Davidiana
  C. integrifolia 'Caerulea'
  Thalictrum aquilegifolium
  T. dipterocarpum
  T. Rochebrunianum 'Lavender Mist'
  Trollius europaeus
  T. 'Fireglobe'
  T. 'Lemon Queen'

- Papaveraceae
  - Glaucium ‘Burbank Hybrids’
  - Macleaya cordata
- Fumariaceae
  - Dicentra formosa
- Cruciferae
  - Aethionema coridifolium
  - A. grandiflorum
  - A. ‘Warley Rose’
  - Alyssum montanum
  - Arabis alpina ‘Rosea’
  - A. caucasica
  - A. caucasica ‘Plena’
  - A. procurrens
  - Aurinia saxatilis ‘Citrina’
  - Hesperis matronalis
  - Iberis sempervirens
- Crassulaceae
  - Sedum spectabile
  - S. Telephium ‘Indian Chief’
- Saxifragaceae
  - Astible x Arendsii ‘Bonn’
  - A. x Arendsii ‘Bridal Veil’
  - A. x Arendsii ‘Etna’
  - A. x Arendsii ‘Mainz’
  - A. astilboides
  - A. Thunbergii ‘Ostrich Plume’
  - A. Thunbergii ‘Vesta’
  - Heuchera sanguinea
- Rosaceae
  - Acaena caesiiglauca
  - Alchemilla alpina
  - A. vulgaris
  - Aruncus dioicus
  - Filipendula purpurea ‘Elegans’
  - F. rubra ‘Venusta’
  - F. Ulmaria ‘Aureo-variegata’
  - Geum x Borisii
  - Potentilla ‘Lady Rolleston’
  - P. napelensis ‘Willmottiae’
  - P. recta ‘Warrenii’
  - P. villosa
  - Sanguisorba obtusa
- Leguminosae
  - Anthyllis montana ‘Carminea’
  - Baptisia australis
  - Cassia marilandica
  - Lathyrus japonicus glaber
  - Thermopsis montana
- Geraniaceae
  - Geranium cinereum ‘Splendens’
  - G. dalmaticum
  - G. Regelii
  - G. sanguineum
  - G. sanguineum prostratum
- Rutacaea
  - Dictamnus albus ‘Rubra’
- Euphorbiaceae
  - Euphorbia Characias
  - E. corollata
  - E. epithymoides
  - E. Myrsinites
- Malvaceae
  - Sidalcea ‘Rosy Gem’
- Guttiferae
  - Hypericum reptans
- Cistaceae
  - Cistus laurifolius
  - Helianthemum nummularium
  - H. nummularium ‘Fireball’
- Lythraceae
  - Lythrum ‘Happy’
  - L. ‘Morden’s Pink’
- Onagraceae
  - Oenothera ‘Fireworks’
  - O. missourensis
  - O. tetragona
  - Zauschneria californica
- Umbelliferae
  - Eryngium amethystinum
  - E. Bourgatii
  - E. proteiflorum
  - E. ‘Violetta’
  - Selinum tenuifolium
- Primulaceae
  - Lysimachia clethroides
  - L. punctata
- Plumbaginaceae
  - Armeria maritima alba
  - A. maritima ‘Laucheana’
  - A. plantaginea ‘Bees’ Ruby’
  - A. ‘Royal Rose’
  - Ceratostigma plumbaginoides
  - Goniolimon tataricum
  - Limonium latifolium
- Apocynaceae
  - Amsonia ciliata
  - A. ciliata texana
  - A. tabernaemontana
- Asclepiadaceae
  - Asclepias incarnata
  - A. tuberosa
- Polemoniaceae
  - Phlox paniculata ‘Mary Louise’
  - P. stolonifera ‘Blue Ridge’
  - P. subulata
  - Polemonium caeruleum
  - P. foliosissimum ‘Blue Pearl’
  - P. reptans
- Boraginaceae
  - Anchusa azurea ‘Dropmore’
  - A. azurea ‘Little John’
  - A. azurea ‘Pride of Dover’
  - A. azurea ‘Royal Blue’
  - Brunnera macrophylla
  - Cynoglossum nervosum
  - Pulmonaria angustifolia
  - P. saccarata
- Labiatae
  - Ajuga pyramidalis ‘Metallica Crispa’
  - A. reptans ‘Alba’
  - A. reptans ‘Bronze Beauty’
  - A. reptans ‘Burgandy Glow’
  - A. reptans ‘Gaity’
  - A. reptans ‘Pink Beauty’
  - A. reptans ‘Silver Beauty’
  - Monarda didyma ‘Violet Queen’
  - Physostegia virginiana
  - Prunella Webbiana ‘Pink Loveliness’
  - Salvia pratensis
  - S. x superba
  - S. x superba ‘East Friesland’

Stachys grandiflora 'Superba'
S. nivea

Scrophulariaceae
Digitalis grandiflora
D. x mertonensis
Penstemon 'Bashful'
P. Digitalis
P. 'Elfin Pink'
P. heterophyllus 'True Blue'
P. 'Petite'
P. pinifolius
P. 'Pink Beauty'
P. 'Prairie Fire'
Phygelius capensis
Veronica incana
V. 'Minuet'
V. pectinata 'Rosea'
V. prostata 'Shirley Blue'

Bignoniaceae
Incarvillea Delavayi

Acanthaceae
Acanthus mollis

Valerianaceae
Centranthus ruber

Dipsacaceae
Morina longifolia
Scabiosa cauasica

Campanulaceae
Adenophora confusa
Campanula carpatica 'White Carpet'
C. Elatines garganica
C. persicifolia 'Alba'
C. Poscharskyana
Lobelia Cardinalis
L. siphilitica
Platycodon grandiflorus
P. 'Nova'
P. 'Pink Giant'

Compositae
Achillea ageratifolia
A. 'Coronation Gold'
A. filipendulina 'Parker's Variety'
A. x Lewisii 'King Edward'
A. Millefolium 'Cerise Queen'
A. Millefolium 'Red Beauty'
A. Millefolium 'Rose Beauty'
A. 'Moonshine'
A. Ptarmica 'Angel's Breath'
A. tomentosa 'Moonlight'
Antennaria dioica
Anthemis Marschalliana
A. Sancti-Johannis
A. tinctoria 'E. C. Buxton'
A. tinctoria 'Kelwayi'
Artemisia Abrotanum
A. lactiflora
A. Schmidtiana 'Silver Mound'
A. 'Silver Frost'
A. Stelleriana
A. versicolor
Aster 'Albert'
A. alpinus 'Goliath'
A. 'Blue Bouquet'
A. 'Bonny Blue'
A. x Frikartii
A. 'Goldflake'
A. 'Marie Ballard'
A. 'Mount Everest'
A. 'Persian Rose'
A. 'Peter Harrison'
A. 'Picture'
A. 'Snow Cushion'
A. yunnanensis 'Napsbury'
Boltonia asteroides
Carlina acaulis
Catananche caerulea
C. caerulea 'Alba'
Centaurea dealbata
C. macrocephala
C. montana
Chrysanthemum coccineum 'Robinson's Red'
C. 'Korean Jewels'
C. x superbum 'Alaska'
C. x superbum 'Little Miss Muffet'
C. x superbum 'Marconi'
Coreopsis 'Baby Sun'
C. 'Goldfink'
C. verticillata
Doronicum cordatum 'Finesse'
Echinacea purpurea
E. purpurea 'Bright Stars'
E. purpurea 'The King'
E. purpurea 'White Lustre'
Echinops humilis 'Taplow Blue'
E. Ritro
Erigeron aurantiacus
E. 'Azure Fairy'
E. Karvinskianus
E. 'Prosperity'
E. speciosus
Gaillardia x grandiflora 'Burgundy'
G. x grandiflora 'Goblin'
Gerbera 'Duplex Hybrids'
Helenium 'Bruno'
H. 'Riverton Beauty'
Helianthus decapetalus multiflorus
H. mollis
Heliopsis 'Summer Sun'
Inula ensifolia
I. Helenium
Liatris specata 'Kobold'
L. spicata 'Silver Tips'
Ligularia dentata 'Desdemona
L. stenocephala
Rudbeckia fulgida Sullivantii 'Goldstrum'
Solidago 'Golden Baby'
Stokesia laevis

NOTES FROM THE ARBORETUM

THE STAFF

Miss Candie Black has resigned her position as Junior Horticulturist in order to pursue graduate studies in horticulture at Rutgers Unviersity. We shall miss her.

Mrs. Farley represented the Arboretum at a regional meeting of the American Association of Botanical Gardens and Arboreta which was held at the Frelinghuysen Arboretum on May 25.

Dr. and Mrs. Gordon report that they had a very enjoyable visit to the gardens at Charleston, S.C. in early April. For reasons of health Dr. Gordon has asked to be relieved of teaching this coming year at the Arboretum, but we are happy to announce that his scheduled course on plant ecology will be conducted by Dr. Albert List, Jr., of the department of biology at Drexel University.

Mrs. Hopkins states that although the weather was something less than perfect, her tour of houses and gardens in England last May was highly successful.

Come down to Kew in lilac time, it isn't far from London and Dr. Marks did just that for a year. After wandering over Europe from Greece to Scotland, he settled down in Richmond, a mile from Kew. This enabled him to run up to the facilities at Kew without much ado. He spent the better part of each week at the British Museum (Natural History) where, amid the specimens collected by Bates, Wallace and Darwin, he continued his revisionary studies in the genus *Papilio* (Lepidoptera). In this connection a close study of the Marienne North paintings at Kew revealed the presence of three Papilionid butterflies. Living as he did in Surrey, Dr. Marks became much interested in the work of the early 20th century gardener, Gertrude Jekyll, some of whose books have become great rarities. The meeting room of the Linnaean Society is a fascinating place, because Linnaeus, Darwin, Bentham, Hooker gazed down from their portraits on the walls. While in residence at the Hope Museum at Oxford, Dr. Marks took tea daily in the room in which the famous controversy between Wilberforce and Huxley took place. Of course he visited the Darwin homestead and many other places associated with the history of botany. He was honored while in England by being created a Fellow of the Linnaean Society and a Fellow of the Royal Entomological Society.

Dr. Penny has continued to act as botanical consultant to the Southern Company Services and has recently completed a study of vegetational impact in Mississippi.

On March 21 Dr. Fogg gave an illustrated lecture on "The Southern Hemisphere and the New Geology" to the Garden Workers and on March 18 he gave a talk on "The Cacti of Mexico" to the Philadelphia Chapter of the Cactus and Succulent Society of America.

A MAGNIFICENT GIFT

On the occasion of the final day for the meeting of all students in the Arboretum School, held at Ker Feal, the class of 1977 presented the director with a set of the fourteen volume *Silva of North America* by Charles Sprague Sargent.

Dr. Sargent was appointed as the first director of the Arnold Arboretum of Harvard University in 1873 and served in that capacity for 54 years until his death in 1927. He early realized that there had been no comprehensive account of the trees of North America since the publication of F. A. Michaux's *Sylva* in 1819 and the more recent works of Thomas Nuttall in 1842 and 1849. Moreover, these treatments, valuable though they were, contained almost no information concerning the trees west of the Mississippi River.

Sargent, therefore, set himself the monumental task of preparing a description of all of the trees of North America, north of Mexico, a labor which occupied most of his time for nearly twenty years. He was extremely fortunate in enlisting the services of Charles E. Faxon, and the 740 plates prepared by this talented artist make this one of the most beautifully illustrated book on trees ever to have been published.

Dr. N. L. Britton, director of the New York Botanical Garden, said of it: "The book is sumptuously printed on heavy paper and cut with broad margins. The illustrations are superb, the descriptions are excellent and the notes on geographic distribution, history and economic importance are of the highest interest and value".

As might have been expected, the first edition (at $300 a set) was soon exhausted and the library which possessed one considered itself fortunate.

In 1947 Dr. E. D. Merrill, then director of the Arnold Arboretum, authorized the preparation of a facsimile copy of the *Silva* by Peter Smith of New York. This edition was printed on thinner paper, reducing the number of bound volumes from fourteen to seven. Even this printing soon became difficult to obtain and although the Arboretum had made repeated efforts to purchase a set, we had almost given up hope. However, through the kind offices of Miss Elizabeth C. Hall, formerly Head Librarian at the New York Botanical Garden, a copy was located and the class was successful in obtaining it.

Although this distinguished work was presented to the director, it is felt that it should be housed in the library of the Arboretum, where it may be consulted by students and visitors. All of us, therefore, are deeply indebted to the Class of '77.

WINTER DAMAGE AT THE ARBORETUM

It had been our intention to present at this time a detailed assessment of the effects of an almost unprecedented severe winter on the plants growing in the Arboretum. However, since even now it is impossible to determine whether or not various specimens will recover, this account will be deferred until the succeeding issue.